REMARKS

The Office Action mailed January 3, 2003 has been received and the Examiner's comments carefully reviewed. Claims 1, 5, 8, 11, 12, 14, 17, 18, 22, 23, 38-44, 46 and 47 have been amended. Claim 45 has been cancelled. Claims 1-44, 46-47 are currently pending.

Applicant's representative Eliav Korakh and Gregory Sebald conducted an interview with Examiner Bernard Souw and the Examiner's supervisor, John Lee on June 17, 2003. Mr. Korakh was present at the Patent Office while Mr. Sebald participated by telephone. The WALLESTON reference and its function as an LED as well as the function of the present invention as a thermal emitter controller were discussed. Proposed amendments to claims 1, 8, 14 and 38 were discussed. It was discussed that the devices function differently and are controlled differently. It was agreed that the proposed amendments overcame the art of record, but that additional searching may be needed. It was agreed to submit a formal response with amended claims for examination and further searching. A formal response is now submitted. Applicant's representatives thank Mr. Souw and Mr. Lee for their cooperation and courtesy extended in granting and conducting the interview.

In the Action, the title was objected to for being too short. The application has been given a new title that is believed to traverse the objection.

Claims 1, 2, 5, 6, 14, 15,18, 19 and 20 were rejected under 35 U.S.C. § 102(b) as being anticipated by WALLESTON. A thermal radiation emitter according to the invention is basically a heating element that is heated by the controller of the invention to a certain temperature (i.e., within thermal radiation spectrum) and then left to cool down to the temperature of the environment.

WALLESTON (US 5,225,828) discloses a system that uses LED for infrared radiation. It will be appreciated by those skilled in the art that such infrared LEDs

produce near infrared radiation and are incapable of producing thermal radiation (i.e., medium infrared or far infrared radiation).

The thermal radiation emitter of the invention requires that power be supplied thereto so as to heat it up to thermal radiation temperatures and not beyond. Accordingly, the controller of the invention is especially designed for this purpose, such that it provides a sequence of pulses that is directed to heat up the thermal radiation emitter to thermal radiation temperatures and not beyond. If a pulse is too short, it may not heat up the thermal radiation emitter to the desired temperature. Otherwise, if a pulse is too long, it may heat up the thermal radiation emitter to a temperature beyond the thermal radiation spectrum.

An infrared LED, such as the one described by WALLESTON, is designed to produce infrared radiation simply when power is provided thereto. Such an LED does not have to be carefully heated up or prevented from heating up beyond certain temperatures (provided that power is provided thereto according to the manufacturer's instructions). The controller disclosed by WALLESTON provides a pulse sequence to these LEDs regardless of thermal considerations. Provided with either short or long pulses, the LEDs operate at the same near infrared wavelengths they were designed for. This controller cannot operate a thermal radiation emitter since pulses that are too short may not heat up the thermal radiation emitter to the desired temperature and pulses that are too long or too frequent may heat up the thermal radiation emitter beyond thermal radiation spectrum.

A thermal radiation marker according to the present invention is directed to produce thermal radiation that can be detected by thermal cameras and cannot be detected by near infrared imaging systems (e.g., image intensifier, night vision goggles and black and white cameras).

WALLESTON directs his system to radiation that can be detected by image intensifier, night vision goggles and black and white cameras (see prior art section of the

application, pages 1 and 2). Using LEDs, WALLESTON's system emits no thermal radiation and hence, cannot be detected by a thermal camera.

Applicant asserts that the recited thermal radiation emitter controller is neither shown nor suggested by WALLESTON.

Regarding claim 14, in addition to the arguments stated above, WALLESTON does not teach or suggest a thermal emitter, rather an infrared LED.

According to claims 5 and 18, when the indicator is on, the thermal radiation emitter may still be heating up, but still too cold for the target temperature and hence not visible to thermal cameras. WALLESTON uses infrared LEDs that do not require heating up and hence, when the indicator of WALLESTON is on, it indicates that the LED is emitting light at its predetermined wavelengths.

Regarding claims 6 and 19, Applicant asserts that the claims are allowable for the reasons stated above for claims 5 and 18, as well as providing improved indication.

Claims 3, 4, 7, 16, 17 and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over WALLESTON. Once a thermal emitter is designed geometrically, its voltage requirements are thereby predetermined. A thermal emitter such as the one used in the invention requires high voltage power, when compared with conventional battery voltage. The system according to the present invention, incorporating such a thermal emitter, and using low voltage power sources (e.g., battery) requires a voltage multiplier to meet the power requirements determined by the emitter. The Examiner gave Official Notice that a voltage multiplier is know in the art as a device having a purpose of boosting the power output of a controller circuit for high power applications and cited several references. GORDON (US 5,661,774) teaches an HV rectifier (multiplier) 210 throughout the text, which does not multiply voltage; rather it rectifies voltage for certain aspects of the system. Accordingly, this element does not provide the functionality required for the operation of the system of the present invention.

BRENDLEMAIR (US 4,346,343) merely recites another US patent 3,808,468 that includes "... a bootstrap FET driver amplifier having a pre-charged relatively higher gate voltage ...". This element does not constitute a voltage multiplier. MARTELL (US 5,351,037) includes a voltage multiplier but only in the claim. There is no mention of a multiplier of any kind in the description and the reference is non-enabling. A person skilled in the art would not learn from MARTELL how to build one.

Regarding claims 4 and 17, the system of the present invention protects the power source for draining. Hence a power cut off occurs when the voltage drops beneath a predetermined level. ROSS (US 6,016,245) discloses a system that protects a device (e.g., memory modules) and not the power source, against high voltage levels. Accordingly, this system cuts off power when the voltage exceeds a predetermined voltage level. Accordingly, incorporating the system of ROSS in the invention shall not protect the power source.

With regard to claims 7 and 21, a thermal emitter emits thermal radiation according to the temperature it is heated to. More power leads to higher temperature, which leads to shorter wavelengths. Less power leads to lower temperature, which leads to longer wavelengths. An LED is a solid-state semiconductor element that produces light at predetermined wavelengths, according to its solid-state design. An LED is not designed to produce thermal radiation. Changing the power within the operation limitations shall cause the LED to produce more or less photons, accordingly, but always at the same wavelengths. Heating up an LED shall cause irreparable damage thereto. Accordingly, LEDs are not suitable for the goals of the present invention (i.e., thermal radiation emission). Applicant asserts that claims 3, 4, 7, 10, 17 and 21 are neither shown nor suggested by the prior art.

Claims 8-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over WALLESTON. The present invention provides a system for thermal radiation emission. The controller, by setting a certain pulse scheme, actually heats up the emitter to a certain

temperature range and maintains that temperature range. This range of temperatures determines the wavelengths that are emitted by the system.

WALLESTON is irrelevant to thermal radiation and does not address it at all. Any pulse scheme suggested by WALLESTON is directed at turning the LEDs on and off for the purpose of embedding information in that pulse scheme. WALLESTON does not provide a pulse scheme that is directed at heating up an element to a predetermined temperature range and maintaining that temperature range.

Substituting an LED with a thermal radiation emitter, within the system of WALLESTON, does not result in thermal radiation. On the one hand, a pulse that is too short shall not heat up the thermal radiation emitter to the appropriate temperature, thereby mot making it visible using a thermal camera. On the other hand, a pulse that is too long shall heat up the thermal radiation emitter beyond the thermal spectrum, thereby making it visible to near infrared or visible light detection systems.

A thermal emitter according to the invention and similar to that of WOOD requires power of at least one WATT to reach temperatures within the thermal spectrum. The power required for driving an LED is two orders below what is needed for a thermal emitter. A conventional LED requires power in the order of tens of milliwatts. Accordingly, the entire system of WALLESTON cannot drive the thermal emitter of WOOD. It likely is not powered with a sufficient battery and it does not incorporate powerful enough drivers to drive power to thermal emitters.

Since WALLESTON is directed at driving an LED and is not directed at driving a thermal emitter, it is not obvious to provide a cooling period.

Applicant asserts that claims 8-13 are neither shown nor suggested by the prior art.

Claims 22-36 and 38-47 were rejected under 35 U.S.C. § 103(a) as being unpatentable over WALLESTON in view of WOOD. As stated above, the thermal emitter of WOOD cannot substitute an LED of WALLESTON.

Regarding claims 29-31, it is not obvious to use a helix instead of filament wire. The helix provides higher mechanical strength over filament wire, especially due to mechanical forces causes by thermal activity. WOOD (in Figure 3) winds the filament wire on the poles to provide some flexibility when heating and cooling, since the filament wire itself exhibits low flexibility. The helix of the present invention exhibits high internal flexibility and hence, can be directly coupled to the poles. The Examiner gave Official Notice that the shape of a helix is a matter of design choice and cited two references. THOMPSON (US 4,430,597) and NORTHRUP (US 6,099,148) do not address the subject of thermal emission. Rather, they both disclose the making of conventional lamps. Claim 38 has been amended to recite a helix shaped wire and is also believed to be allowable for these reasons.

According to the invention, a thermal emitter emits at several wavelengths, some of which are not required or desired for a particular application. Accordingly, the invention adds a housing window that is transparent only to predetermined wavelengths. As mentioned above, it is not trivial to substitute the LED of WALLESTON with a thermal emitter of WOOD. A LED, emitting radiation only at a specific wavelength. Hence, there is no motivation to use such a transparent window for a device that initially produces only at the desired specific wavelength.

As mentioned above, it is not trivial to substitute the LED of WALLESTON with a thermal emitter of WOOD. An LED, such as used by WALLESTON incorporates its own lens therewith, as part of the general design. Accordingly, WALLESTON does not require any lens and it would not be obvious to one of ordinary skill in the art to have the window be a lens.

Applicant asserts that claims 22-36, 38-44, 46 and 47 are neither shown nor suggested by the prior art.

Applicant respectfully requests entry of the above amendments. Applicant asserts that the claims are in condition for allowance. If the Examiner believes a telephone conference would be beneficial with regard to the above amendments, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Respectfully submitted,

MERCHANT & GOULD P.C.
P. O. Box 2903
Minneapolis, Minnesota 55402-0903
612.332.5300

Date 7/1/03

Gregory A. Sebald
Reg. No. 33,280
GAS:PSTtdm/klg